

Claims

1. A lithium polymer battery comprising a negative electrode and a positive electrode,

wherein the negative electrode comprises a copolymer of at least one first primary monomer and 1-30 wt.% of a first comonomer, and

5 wherein the positive electrode comprises at least one homopolymer of a second primary monomer or a copolymer of at least the second primary monomer and up to 25 wt.% of a second comonomer, and

wherein the amount of the first comonomer is greater than the amount of the second comonomer.
2. The battery of claim 1 wherein the negative electrode comprises 3-15 wt.% of the first comonomer and the positive electrode comprises 0-6 wt.% of the second comonomer.
3. The battery of claim 1 wherein the first and second comonomers are each hexafluoropropylene (HFP).
4. The battery of claim 3 wherein the first primary monomer in the negative electrode and the second primary monomer in the positive electrode are each of vinylidene fluoride (VDF).

5. The battery of claim 4 wherein the negative electrode comprises the copolymer of PVDF and 5-10 wt.% HFP, and the positive electrode comprises the homopolymer or the copolymer of PVDF and 0-6 wt.% HFP.
6. The battery of claim 4 further comprising at least one separator layer between the positive and negative electrodes, wherein the at least one separator layer comprises a homopolymer or copolymer of PVDF.
7. The battery of claim 1 further comprising a separator layer between the positive and negative electrodes comprising a copolymer of a third primary monomer, wherein the first, second and third primary monomers are identical.
8. The battery of claim 1 wherein the positive electrode consists essentially of a PVDF homopolymer.
9. The battery of claim 8 wherein the negative electrode comprises the copolymer of PVDF and 3-15 wt.% of the first comonomer.
10. The battery of claim 1 wherein the first and second primary monomers, after copolymerization or homopolymerization, are each selected from the group consisting of: polyvinylidene fluoride, polyvinylidene chloride fluoride, polyvinylidene chloride, polyvinyl chloride, polyvinylchloride acetates,
5 polyacrylonitriles, polyfluoroethylenes, polyfluoropropylenes, polyolefins,

acrylic acid modified polyethylene, maleic acid modified polyethylene, acrylic acid modified polypropylene, maleic acid modified polypropylene, polyvinyl alcohols, polyglycols, polyacetates, polyesters, polyacrylates, polycarbonates, polyethylene oxides, polypropylene oxides, polyacrylic acid esters, cellulose acetate, cellulose butyrate, nylons, polyurethanes, polyterephthalates, and polystyrenes.

11. The battery of claim 1 wherein the first and second comonomers are each selected from the group consisting of HFP and chlorotrifluoroethylene (CTFE).

12. A lithium polymer battery comprising a negative electrode and a positive electrode,
- wherein the negative electrode comprises a polymer (POLYneg) that is a copolymer of a primary monomer (MONneg) and a comonomer (COMMneg), according to the formula $\text{COMMneg}/(\text{MONneg} + \text{COMMneg}) = 0.01 \text{ to } 0.3$, and
- wherein the positive electrode comprises a polymer (POLYpos) that is a homopolymer of a primary monomer (MONpos) or a copolymer of MONpos and a comonomer (COMMpos), according to the formula $\text{COMMpos}/(\text{MONpos} + \text{COMMpos}) = 0 \text{ to } 0.25$, and
- wherein $\text{COMMneg}/(\text{MONneg} + \text{COMMneg}) > \text{COMMpos}/(\text{MONpos} + \text{COMMpos})$.
13. The battery of claim 12 wherein COMMneg and COMMpos are each hexafluoropropylene (HFP).
14. The battery of claim 13 wherein MONneg and MONpos, after copolymerization or homopolymerization, are each polyvinylidene fluoride (PVDF).
15. The battery of claim 12 wherein POLYpos consists essentially of a PVDF homopolymer.

16. The battery of claim 12 wherein MONneg and MONpos, after copolymerization or homopolymerization, are each selected from the group consisting of: polyvinylidene fluoride, polyvinylidene chloride fluoride, polyvinylidene chloride, polyvinyl chloride, polyvinylchloride acetates, polyacrylonitriles, polyfluoroethylenes, polyfluoropropylenes, polyolefins, acrylic acid modified polyethylene, maleic acid modified polyethylene, acrylic acid modified polypropylene, maleic acid modified polypropylene, polyvinyl alcohols, polyglycols, polyacetates, polyesters, polyacrylates, polycarbonates, polyethylene oxides, polypropylene oxides, polyacrylic acid esters, cellulose acetate, cellulose butyrate, nylons, polyurethanes, polyterephthalates, and polystyrenes.
17. The battery of claim 16 wherein COMMneg and COMMpos are each selected from the group consisting of HFP and chlorotrifluoroethylene (CTFE).

18. A lithium polymer battery comprising a negative electrode and a positive electrode,

wherein the negative electrode comprises a polymer (POLYneg) that is a copolymer of a polyvinylidene fluoride (PVDFneg) and a comonomer (COMMneg), according to the formula $\text{COMMneg}/(\text{PDVFneg} + \text{COMMneg}) = 0.03 \text{ to } 0.15$, and

wherein the positive electrode comprises a polymer (POLYpos) that is a polyvinylidene fluoride (PVDFpos) homopolymer or a copolymer of PVDFpos and a comonomer (COMMpos), according to the formula $\text{COMMpos}/(\text{PDVFpos} + \text{COMMpos}) = 0 \text{ to } 0.06$ and

wherein $\text{COMMneg}/(\text{PDVFneg} + \text{COMMneg}) > \text{COMMpos}/(\text{PDVFpos} + \text{COMMpos})$.

19. The battery of claim 18 wherein COMMneg and COMMpos are each hexafluoropropylene (HFP).

20. The battery of claim 18 wherein POLYpos consists essentially of the PVDFpos homopolymer.